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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,715	09/11/2003	Doug Van Den Broeke	55071-283	4766

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MCDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

LU, TONY W

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 05/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/659,715

Applicant(s)

BROEKE ET AL.

Examiner

Tony Lu

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6,13,15-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,13 and 15-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This is in response to the amendment filed on 02/06/2006.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,3-6,13,15-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al US6605481 in view of Liu US6664009.

With respect to claims 1,13 and 26, Wu et al disclose a method and/or an apparatus and/or a computer program product for generating a mask for printing a pattern comprising a plurality of features having varying critical dimension(see col.7, lines 1-13) comprising: obtaining data representing said pattern(400); defining a plurality of distinct zones(zone 0, zone 1....zone N) based on the critical dimensions of said plurality of features(410, also read col.5 lines 5-15); assigning each of said features into one of said plurality of distinct zones(420, also read col.7, lines 13-32); wherein said plurality of distinct zones comprises: a first zone(zone 3) in which features having a critical dimension less than or equal to a first predetermined amount; a second zone(zone 2) in which features having a critical dimension greater than said first predetermined amount and less than a second predetermined amount; and a third zone(zone 0 or zone 1) in which features having a critical dimensions greater than said second predetermined amount(read col.5 lines 15-40 and col.7, lines 1-13).

Wu et al fail to teach techniques used to image each said first, second and third zones.

Liu discloses a system and its method for optical lithography processes for manufacturing integrated circuits teach the possibility of selectively use of both chromless and chrome techniques(read col.2, lines 32-45).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wu et al by utilizing different imaging techniques for manufacture the mask in order to allow efficient and/or beneficial manufacturing processes based on the critical dimensions of the features.

With respect to claim 19, Wu et al disclose a system manufacturing method comprising the steps of: a) providing a wafer(read col.1, lines 17-47) that is at least partially covered by a layer of radiation-sensitive material(photoresist layer); b) providing a projection beam of radiation using a radiation system((visible light source or an ultraviolet light source); c) using a pattern on a mask to endow the projection beam with a pattern in it's crosse-section(read col.1, lines 17-47); d) projecting the patterned beam of radiation onto a target portion of the layer of radiation sensitive material(read col.1, lines 33-40), where in said mask is formed by: obtaining data representing said pattern(400); defining a plurality of distinct zones(zone 0, zone 1....zone N) based on the critical dimensions of said plurality of features(410, also read col.5 lines 5-15); assigning each of said features into one of said plurality of distinct zones(420, also read col.7, lines 13-32); wherein said plurality of distinct zones comprises: a first zone(zone 3) in which features having a critical dimension less than or equal to a first

predetermined amount; a second zone(zone 2) in which features having a critical dimension greater than said first predetermined amount and less than a second predetermined amount; and a third zone(zone 0 or zone 1) in which features having a critical dimensions greater than said second predetermined amount(read col.5 lines 15-40 and col.7, lines 1-13).

Wu et al fail to teach techniques used to image each said first, second and third zones.

Liu discloses a system and its method for optical lithography processes for manufacturing integrated circuits teach the possibility of selectively use of both chromless and chrome techniques(read col.2, lines 32-45).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wu et al by utilizing different imaging techniques for manufacture the mask in order to allow efficient and/or beneficial manufacturing processes based on the critical dimensions of the features.

With respect to claims 3,4,15 and 16, per the above discussion, Wu et al fail to teach at least one of said features in said first zone is implemented in said mask as adjacent phase edges etched in a substrate.

Liu discloses phase shifting masks use chrome between edges of two phase shifters(read col.2, lines 33-40, also see fig.2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wu et al utilizing the phase shifting method taught by Liu in order to provide more control to the critical dimension and to improve mask manufacturability.

The further citations regarding chrome patches disposed on an upper surface of said substrate remaining between said adjacent phase edges in claims 10 and 16 would have been obvious for similar reasons set forth above.

With respect to claims 5 and 17, per the above discussion, Wu et al lack a clear teaching of said chrome patches operate to control the percentage transmission of a light source incident on said mask.

Liu discloses the chrome is used to control light transmission(read col.1 lines 51-67, and col.2 lines 1-5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wu et al by using the teach taught by Liu in order to provide more control to the light transmission of the mask and to assist in the definition of the feature size.

With respect to claims 6,18 and 27, per the above discussion, note that Wu et al disclose use of two masks in a wafer fabrication process wherein the first mask and/or the second mask can include phase shifting regions(read col.4, lines 10-25), but Wu et al fail to teach compiling the features contained in said first zone, and chromeless phase components of the features contained in said second zone, generating a first mask for imaging the chromeless phase components contained in said first zone and said second zone; and compiling chrome components of the features contained in said second zone, and the chrome components of the features contained in said third zone, generating a second mask for imaging the chrome components contained in said second zone and said third zone.

Although Wu et al fail to teach aforementioned generation of masks, separating chrome and chromless phase components of the features and forming a chrome and a chromeless mask respectively would enable the chrome mask to prevent the creation of undesirable artifact regions that would be created by the chromless shift mask.

It would have been obvious to one of ordinary skill in the art at time of the invention to modify Wu et al accordingly in order to provide a better lithography results.

With respect to claim 20, per the above discussion, Wu et al disclose a device(a semiconductor wafer, read col.1, lines 40-46) manufactured using a method according to claim 19.

With respect to claim 21, per the above discussion, Wu et al disclose a mask for use in a photolithography process manufactured in accordance with claim 1(read col.1, lines 10-15).

With respect to claims 22,24 and 28, per the above discussion, Wu et al disclose a simulation process is utilized to determine the aerial image behavior of a selected imaging process relative to the critical dimensions of the plurality of features(note that Wu et al use a test mask is created to produce zone definition by running the test mask through a wafer fabrication process to produce simulation results, read col.5, lines 55-66 and col.6, lines 1-10).

With respect to claims 23 and 25, per the above discussion, although Wu et al lack a clear teaching for the process of forming of the chrome patches, selecting a specify process/method of forming the chrome patches in order to assist in the definition of the feature size would have been obvious to one of ordinary skill in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wu et al accordingly in order to improve mask manufacturability and/or to better control the size of the resulting artifact by using the chrome patches.

With respect to claim 29, per the above discussion, Wu et al disclose a manufactured device(semiconductor chips and/or wafer, read col.1, lines 40-45 and col.7, lines 60-65.

Response to Arguments

Applicant's arguments with respect to claims 1,3-6,13,15-29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

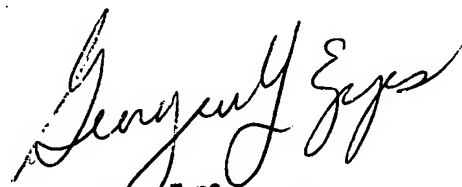
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Lu whose telephone number is 5712728448. The examiner can normally be reached on M-F 9:00am- 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 5712722328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TL



Georgia Epps
Supervisory Patent Examiner
Technology Center 2800